



COVID-19: SYMPTOMS & SPREAD

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What symptoms does one experience if they have COVID-19? How long does it take to recover from infection? When is hospitalization likely to be necessary? Can asymptomatic people spread the infection? What precautions help minimize the risks of transmitting the infection?

CCOVID-19 is a pandemic caused by the SARS-CoV-2 virus. Once the virus enters our body, it infects cells in the respiratory tract, replicates within them, and releases new viral particles that can, in turn, infect other cells. This **incubation** period typically extends between 1-5 days, but can in some cases extend up to 14 days. Since there are no signs of the host's immune system fighting the virus, tests for antibodies in an infected person's blood sample will appear negative. Screening for viral RNA in their swab/saliva sample might also appear negative. However, people in this stage of infection are capable of shedding the virus (through their breath, sneeze, cough, saliva, and touch) and infecting other people. Once they appear, symptoms vary depending upon the stage of infection.

Symptoms

The **early** infection stage lasts about a week. People experiencing this stage of infection may experience mild symptoms of dry cough, fever, fatigue, and muscle pain. A small fraction might develop a short-lived bout of diarrhoea, sore throat, or headache. Some people seem to lose their sense of smell or taste. None of these symptoms are found in all patients (and different sources report differing fractions). Since many diseases have such symptoms, it may be hard to figure out if the person showing them has COVID-19 or not. Even a physician may advise an observation period to see if there are any changes in symptoms. One in six patients, particularly those with pre-existing health problems, may transition into the **progressive** stage of infection, and start showing

breathing difficulties on Days 5–6 (with Day 1 marking the start of symptoms). It is useful to measure the patient's respiration rate (the normal rate is 12–16 breaths a minute at rest) while at rest or sleeping. Change in respiration rate is an indication that the person may have COVID-19, and a doctor or a hospital should be contacted. If their breathing difficulties become more severe, patients may need to visit a hospital. Around Day 8, roughly 5–15% of patients start experiencing build-up of fluid in their lungs. This is pneumonia. Problems with blood clotting in blood vessels and capillaries may become predominant in this stage. Some patients experience relief from breathing difficulties a week into this stage. Recovering patients may be discharged with the instruction to remain in self-isolation for the next 7–14 days. For the 4–5% of patients who progress into the **advanced** infection stage (marked with severe symptoms), hospitalization can extend up to Day 42. If the patient's symptoms continue deteriorating, they may be admitted into the Intensive Care Unit (ICU) within 2–3 days. Some patients may develop sepsis, a life-threatening condition that can lead to multiple organ failure. Those who show signs of Acute Respiratory Distress Syndrome (ARDS) might be put on a ventilator. Some patients may not become better.

It's important to remember that not every infected person experiences all three stages. Also, the symptoms in each of these stages of infection can show individual variations in severity

(see **Table I**). The good news is that 82% of symptomatic patients experience only **mild or moderate symptoms** that do not require hospitalization. After the first week of infection, their symptoms reduce, and they begin to become better. **Fully asymptomatic** patients recover without showing any symptoms at all. Taking a swab/saliva sample from an infected person typically gives a positive result a week after infection, and a negative result after 10 days. Much fewer people experience **severe symptoms**. These become apparent during the progressive stage of infection (Day 7). This category includes **late symptomatic** patients who may show no symptoms at all in the early infection stage; the first symptoms they show are breathing difficulties in the progressive stage of the disease. Other late symptomatic patients may not show breathlessness, but the oxygen levels in their blood reduce (this can be immediately tested with a pulse oximeter) to a level that can be quite serious. Symptoms associated with the advanced stage of infection are seen only in severe cases. Deaths start to occur in this category of patients from the third day of the advanced infection stage. Late symptomatic patients may face the greatest danger. For those who do not survive the virus, the average number of days from onset of symptoms until death is 18–19 days.

Two categories of people seem more prone to severe disease. One category consists of infected people (young or old) with heart disease, lung disease,

or uncontrolled diabetes. The other category includes caregivers, nurses, doctors and other health workers with prolonged exposure to infected people and higher viral "loads".

Spread

Anyone infected with the virus — whether they are symptomatic, in the incubation phase, or are fully asymptomatic — can shed and spread the virus for 21 days. Every time an infected person sneezes or coughs, they eject **milli** (100–1000 microns in size; 1000 microns make 1 millimetre) and **micro** (1–10 microns in size) droplets from the nose or mouth. It is through these droplets that the virus (each about 0.1 micron in size) is expelled into the surrounding air. Microdroplets can also be ejected when infected people sing or talk, or even when they breathe out.

A healthy individual can come into contact with these expelled viruses in multiple ways (see **Fig. 1**). One route is through close contact with droplets from an infected person. Keeping a distance of at least 2 m (or 6 feet) from other people, referred to as physical distancing, can help minimize this risk. Another route is when our eyes, nose, or mouth comes into direct contact with microdroplets floating in the air (like aerosol sprays used for perfumes). These droplets can remain suspended in the air for as long as 10–15 minutes in a confined space. Some researchers have referred to this route as **airborne transmission** (a term that, until recently, was used to define the main route of transmission of highly contagious diseases like measles, chicken pox, and tuberculosis). Wearing masks and avoiding crowded places reduces the chances of being infected in this way. For "across-the-counter" shop, bank and office transactions, masks and physical distancing are crucial. A third route of transmission is through contact with physical surfaces — like hard plastic and steel — that milli-droplets settle upon. The viral load on a physical surface degrades rapidly over time. But if we touch our face immediately after

Table I. Stages of infection in different categories of infected individuals.

An infected individual may develop mild, moderate, or severe symptoms depending on the stages of infection they experience. Some may develop symptoms very late (late symptomatic cases), and some may not develop any symptoms at all (fully asymptomatic cases).

Stage of infection	Mild or moderate cases	Fully asymptomatic cases	Severe cases	Late symptomatic cases
I. Incubation or early infection	1–5 days	14–21 days	1–5 days	6–13 days
II. Progressive	7 days	–	7 days	0–7 days
III. Advanced	–	–	7–28 days	7–28 days

touching these surfaces, the virus can be transferred from our hands to our eyes, nose, or mouth. This risk can be minimized if we avoid touching our face with unwashed hands, and frequently wash our hands with soap.

How many viruses are sufficient to infect another person? Perhaps 1000 viruses are enough. But not everybody infects others in the same way. Although asymptomatic individuals may shed and spread the virus for 21 days after exposure to it, many do not spread the virus much. Some infected people, called **super-spreaders**, can release up to one lakh viruses every minute, but there is no known method of recognizing them. The spread of the virus can also vary depending on the nature and context of social interactions (see Table II). In general, outdoor interactions are better than those that happen indoors, large spaces are better than confined ones, low people density is better than high, and short interactions are better than longer ones.

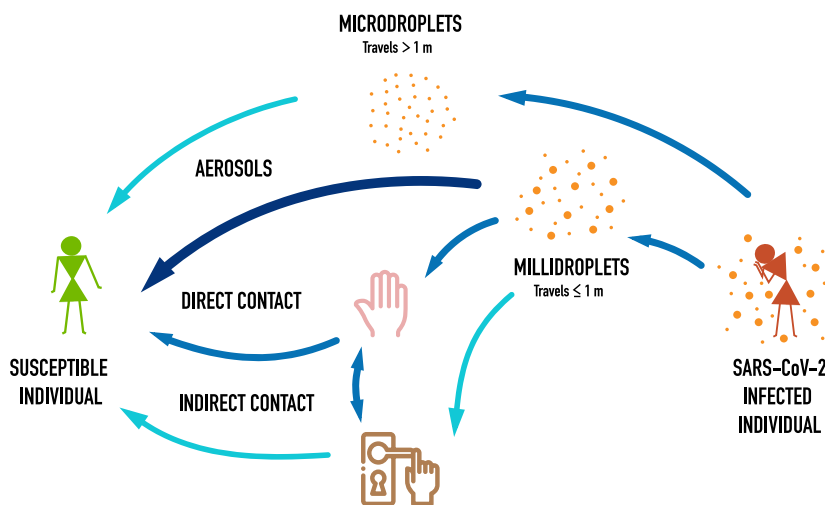


Fig. 1. SARS-CoV-2 spreads through contact with droplets from an infected person. Some people catch the infection through close contact with these secretions or droplets. Others catch it by direct contact with micro-droplets that can remain airborne for as long as 10–15 minutes in a confined space. Yet others can catch it indirectly. This happens when a person touches their face with their hands immediately after touching a physical surface that milli-droplets have settled upon.

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Table II. The spread of COVID-19 can vary depending on the nature and context of social interaction.

Activity	Viruses released/Exposure time/Risk	Precautionary measures
Breathing	~ 20 viruses per minute	Mask, distancing
Speaking	~ 200 viruses per minute	Mask, distancing
Cough	Lakhs of viruses per cough	Distancing
Sneeze	Lakhs of viruses per sneeze	Distancing
Caregiver with carrier (of infection)	Below 45 minutes	Mask, distancing
Talking to carrier	Below 5 minutes	Mask
Passing by carrier	Low risk	Mask
Well-ventilated space	Low risk	Distancing
Narrow space	High risk	Mask
Shopping	Medium risk	Mask, entry in small batches
Public bath/toilet	High surface-transmission risk	Disinfect
Restaurants/temples	High risk	Outdoors, entry in small batches
Workplaces/schools	High risk	From home/online
Parties/weddings	Very high risk	–
Meetings/conferences	Very high risk	Online
Concerts/cinemas	Very high risk	–

Parting thoughts

Unlike cholera, malaria or dengue, COVID-19 spreads mainly through human contact. Unfortunately, a large number of people are still complacent about the transmission of the disease.

Since travel contributes to spread, the risks associated with it can be minimized by testing travelers in stations and airports and encouraging them to quarantine after their journeys. Avoiding

crowded areas, using a mask to cover the nose and mouth in public spaces, physical distancing from other people, and frequent washing of hands can all help minimize the risk of infection.

Key takeaways

- Symptoms of COVID-19 vary during the incubation, early infection, progressive, and advanced stages of SARS-CoV-2 infection
- Depending on the severity of symptoms, most of those infected with the virus recover after experiencing only mild symptoms, while some may show no symptoms at all (asymptomatic).
- Those with severe symptoms, including those who are late symptomatic, may require hospitalization. Some of them may not recover.
- Fully asymptomatic people, individuals in the incubation phase, and symptomatic patients can all shed and spread the virus.
- The virus is transmitted through direct or indirect contact with droplets (milli or micro) that an infected person releases when she coughs, sneezes, sings, talks, or breathes out.
- Avoiding crowded spaces, the use of face masks, physical distancing, and frequent washing of hands with soap can all reduce risk of infection.



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